local botanists, a complete group of the pollens of Nevada, his further reports will be of great interest.

The physician must watch the result of treatment carefully to obtain the best results. It is often advisable to continue treatment at weekly intervals during the season when the treatment has been preseasonal. When treatment is begun during the season, doses must be increased as rapidly as the local reaction allows. Thus in seasonal treatment the desensitizing dose can be reached within a comparatively few days, making co-seasonal treatment well worth while. The intradermal administration of pollen, as suggested by Phillips, promises to be of definite value in the rapid control of hay fever symptoms.

Whereas seasonal hay fever is nearly always due to pollen, such symptoms may be due to animal emanation proteins, orris root, various dusts, or even to seasonal foods. Where these are not the primary causes they may be complicating factors which should be recognized in the treatment of the hay fever problem. This emphasizes the fact that for proper control of patients with hay fever resistant to pollen therapy, especially if there is a history of mild symptoms throughout the year, other types of proteins than pollen should be used in testing the patient. This applies, of course, to the unusual case, but mention is made of these other causes to round out this consideration of hay fever.

NITROUS-OXIDE-OXYGEN ANESTHESIA OF CHILDREN*

REPORT OF TWO HUNDRED ANESTHETIZATIONS OF CHILDREN UNDER 10 YEARS OF AGE

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IT was formerly held by anesthetists and surgeons in general that children could not be given nitrous-oxide-oxygen as an anesthetic agent. It was conceded that children from 7 to 10 might have a nitrous-oxide induction to an ether anesthesia, but that children under 7 must be given a straight ether narcosis with perhaps the use of oil of orange to mask the odor in the early conscious period. There seemed to be two main objections to the use of nitrous-oxide-oxygen. First that the task of breathing through valves in a closed mechanical apparatus was too great for the weak respiratory systems of young children. That the tidal volume of air for each respiration was too small to reach back to the supply with the closed apparatus and therefore nitrous-oxide-oxygen should not be given until the respiratory organs were developed enough to exhale a tidal volume of 300-400 cc. or, according to Gwathmey, until the child has reached the age of 10 or 12. The other reason seems to be that the plane of anesthesia in children is a very narrow one and that a smooth, even narcosis is difficult to maintain. A very slight change in the mixture takes the patient from too light to too deep narcosis. Very frequently children have little or no color, and where the anesthesia is so dependent on color changes there is no reliable gauge to the child's condition and anoxemia or asphyxia may too easily be mistaken for anesthesia.

Of recent years, however, the age limit for the use of gas has been gradually lowered until now, in most hospitals, it is being used to induce ether anesthesias from 3 to 4 years up, while many hospitals are using nitrous-oxide-oxygen anesthesia for young children. Doctor McCurdy uses nitrous-oxide for children of 6 months. Doctor McKesson uses gas from ten days, and feels that age has no influence at all in the selection of an anesthetic. Except for great care in securing the proper equation of gases, he does not think the technique differs from that in anesthetizing adults. In 1923 Doctor Botsford reported thirty cases under 4 years of age operated with nitrous-oxide-oxygen anesthesia. She feels that nitrous-oxide with sufficient oxygen to prevent cyanosis should be the anesthetic of choice for all operations where ether is contraindicated, and may be safely administered to infants, especially where further anesthetizations are necessary within short intervals of time.

The advantages of nitrous-oxide-oxygen over ether need not be enumerated. Suffice to say that nitrous-oxide-oxygen is to be preferred in respiratory tract infections to reduce the danger of postoperative pneumonia; in tuberculosis, to prevent dissemination of the disease; in high fevers and diabetes, to prevent acidosis; in nephritis and pyelitis, to prevent further kidney damage, and in mastoids with the usual attendant acute pharyngeal conditions to lessen the danger of postoperative lung complications.

It is with some temerity that I offer so limited a series of cases, realizing fully that there are many children's hospitals in the country which could show a much larger series, but a survey of the literature fails to find them reported. In a general hospital relatively few children are operated upon, and this report is limited to personal experience.

There were no fatalities in the series and only one near fatality, a baby of 2 years who developed a cervical adenitis following a mastoidectomy. The baby was successfully anesthetized with nitrous-oxide-oxygen for the mastoid, and no difficulty was anticipated with the second anesthetic when it became necessary to drain the abscess in the neck. However, the patient was very pale and apparently was given a too high percentage of nitrous-oxide. He stopped breathing, pupils were dilated, and all means of resuscitation, such as oxygen under pressure, artificial respiration and dilatation of the rectum, seemed to have failed, when the child of his own accord finally took a breath. Having once started, he continued and was able to leave the hospital in good condition. This experience taught us to err on the side of too light rather than too deep a concentration of nitrous oxide.

CLASSIFICATION OF CASES

One hundred and eleven of the patients were anesthetized for some genitourinary condition such as cystoscopies, pyelitis, or congenital malformation of the urinary tract where it was particularly desired that no ether be given. Ninety of these were for cystoscopic examinations that took from fifteen minutes to over an hour. A very light anesthesia usually is sufficient for these after the cystoscope has been inserted and the bladder has been distended with fluid. The remaining twenty-one were for longer truly operative procedures such as nephrectomies, ureteroenterostomies and plastic operations for epispadias, etc.

Fifty-one of the two hundred were for orthopedic

* Chairman's address, Section on Anesthesiology, read before the California Medical Association at the Fifty-Sixth Annual Session, April 25-28, 1927.

conditions. Many of these were on tuberculous subjects, and ether was therefore contraindicated.

Twenty-seven were general surgical cases; about half this number were appendectomies. The remainder were mainly hernias, drainage of abscesses and suturing of cuts, lacerations, etc. One was a thyroidectomy in a girl of 10 with anesthesia lasting two hours. One anesthetic was given to a child of 3, using an unreliable gas machine in an out-of-town hospital, for an appendectomy complicated by severe bronchitis.

Eleven were in the nose and throat department. These were all mastoids, and two of the patients were diabetics—one 10 years of age, the other 3. Nitrous-oxide-oxygen has not been used for tonsillectomies, as the dissection method for tonsillectomies is preferred, and fifteen to twenty minutes is rather long for satisfactory use of nitrous-oxide-oxygen when working in the back of the throat.

CLASSIFICATION AS TO AGES

There were eighty-five patients from 6 to 10 years of age, sixty-nine from 3 to 5 years, and forty-six of 2 years or under. The youngest was a baby of 11 months. The anesthestic was given for the radical removal of a sarcomatous kidney. That afternoon the baby was found standing up in her crib, laughing and shaking the crib gate as if nothing serious had happened to her that day.

REPEATED ANESTHETIZATIONS OF SAME CHILDREN

Quite a number of children had chronic trouble which needed repeated treatments. One boy with congenital bladder malformation had seventeen nitrous-oxide-oxygen anesthetizations over a period of two years, beginning when he was 2 years old, lasting until he was 4. One girl of 5 years had ten anesthetics within two months; three of them were for major operations and seven were for cystoscopies. One child of 3 years had nine anesthetics within six months. Another child of 2 years had eight anesthetics in three months. Two 5-year-old girls had five anesthetics each within two months. Four children had four anesthetics each, six had three each, and fourteen had two, while the remaining ones of the two hundred had one each. No untoward effects of repeated anesthetizations were ever noted. The children themselves became rather skeptical of the entire procedure and more reluctant to take the gas, but practically all could be reasoned with and understood that, after all, the gas was their best friend in the process of getting well.

TECHNIQUE OF ADMINISTERING ANESTHETICS

The gas machines employed were either the Ohio Monovalve or the McKesson. The procedure differs not the slightest from that used in administering to adults. In strong vigorous youngsters the induction is with pure nitrous-oxide lasting usually about forty-five seconds; then the mixture of nitrous-oxide-oxygen is given and continued to the end, when pure oxygen is given for about a minute.

In very pale, anemic, weak children the induction is made with a mixture of nitrous oxide and oxygen, the patient never being given pure nitrous oxide or allowed a too high percentage of nitrous oxide during anesthesia. Here also pure oxygen is given at the close.

Rebreathing and a closed system is used when relaxation is insufficient. Contrary to the old theory that children could not manage an anesthetic with a closed system, no difficulties at all have been found.

CONCLUSIONS

1. Nitrous oxide is the anesthetic of choice, especially in respiratory tract infections, tuberculosis, high fevers, diabetes, kidney pathology, and acute infections of the ear, nose and throat.
2. Children bear nitrous-oxide-oxygen anesthesia as well as adults, and there should be no age limit for its use.
3. Contrary to the old theory, children seem perfectly able to handle a closed system of anesthesia.
4. Technique of administration to children is the same as to adults.
5. Color changes in pale children are difficult to detect, and these children should receive a larger percentage of oxygen in the mixture.
6. No ill effects were noted from repeated anesthetizations of the same subject.
7. Two hundred administrations of nitrous-oxide-oxygen were given without ether, without complications and without a fatality.

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NON-INVERSION OF THE APPENDIX STUMP*

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DISCUSSION *by Charles G. Levison, M.D., San Francisco; Harold Brunn, M.D., San Francisco; H. A. L. Ryfkogel, M.D., San Francisco.*

IT is extremely disturbing to have our attention called to the startling fact that the mortality rate for appendicitis in the United States instead of declining as it should has been steadily increasing during recent years. Willis,[1] who analyzed the reports of the Bureau of Vital Statistics at Washington, concludes that in 1905 the death rate from appendicitis was 11.0 per 100,000, whereas in 1922, the last year for which figures are available, the rate was 14.4, or an increase of 30 per cent.

A disclosure of this nature should cause physicians to study the reasons for this increasing mortality and provide for their elimination. It is the purpose of this paper to review methods of treating the appendix stump as only one particular phase of the surgical technique which is believed to be responsible for a small but very definite percentage of the bad results.

The present methods of treating the appendix stump are mainly three (refer to Figure 1a):

(a) A preliminary ligation of the appendix at its base, its removal and the inversion of the ligated stump by a purse-string suture.

(b) The true inversion method in which, without any previous ligation at its base, the appendix

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